

Morgan Lewis

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March 8, 2019

Via ECFS

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

**Re: Deere & Company
Notice of *Ex Parte* Meetings
WC Docket No. 10-90, WT Docket No. 10-208; WC Docket No. 11-10; IB
Docket No. 11-109; IB Docket No. 17-16; File No. SAT-AMD-20180531-00044;
File No. SAT-AMD-20180531-00045**

Dear Ms. Dortch,

On March 6, 2019, representatives of Deere & Company (“Deere”), Mark N. Lewellen, Manager of Spectrum Advocacy in Washington, DC and John W. Rauber, Jr., Director, Washington Affairs along with the undersigned as outside counsel for Deere, met with Rachael Bender, Legal Advisor to Chairman Pai, Evan Swarztrauber, Policy Advisor to Commissioner Carr, and Randy Clarke, Legal Advisor to Commissioner Starks. Mr. Lewellen and I also met with Umair Javed, Legal Advisor to Commissioner Rosenworcel and Erin McGrath, Legal Advisor to Commissioner O’Reilly.

During these meetings we discussed Deere’s support for Commission policies and rules that encourage the deployment of mobile and wireline broadband services and facilities that cover underserved rural areas of agricultural operations including cropland. Today’s high precision agriculture and smart farm technologies require broadband connectivity. Although precision agriculture uses multiple wireless and satellite technologies for various purposes, terrestrial cellular service (commercial mobile radio service) is critical for mobile services in the field as well as at the farmhouse.

We discussed how the dramatic and continuing advancement of American production agriculture requires that we expand how we think about rural connectivity. Today’s modern farm machinery incorporates 4G modems that rely on cellphone coverage for wireless broadband connections in the field. With mobile broadband, that farm equipment

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can rapidly and seamlessly transfer data for use in real time crop analysis and operate together in close coordination in ways that greatly enhance crop yield, reduce costs and delays, and minimize inputs of seed, water, fertilizers, and pesticides. The greater crop yields, cost efficiencies, and environmental sustainability made possible by high precision agriculture and smart farming techniques greatly benefit rural economies and the American public generally.

We discussed the specific need for improved data collection and mapping techniques that accurately identify gaps in mobile broadband coverage in areas of agricultural operations. To that end, we discussed potential mapping tools that could be developed using Commission cell tower data in combination with publicly available U.S. Department of Agriculture (“USDA”) nationwide crop information. We discussed state examples using these tools as shown on the attached slide deck. Commission rules and support programs should recognize and address the growing unmet need for mobile broadband coverage not only in residential population centers, but also in areas of agricultural operations.

We also discussed the important role that GPS plays in high precision agriculture and the benefits to high precision GPS made possible through continuing access to Galileo satellites.

Please address any questions regarding this notice to the undersigned.

Very truly yours,

/s/

Catherine Wang

Counsel for Deere & Company

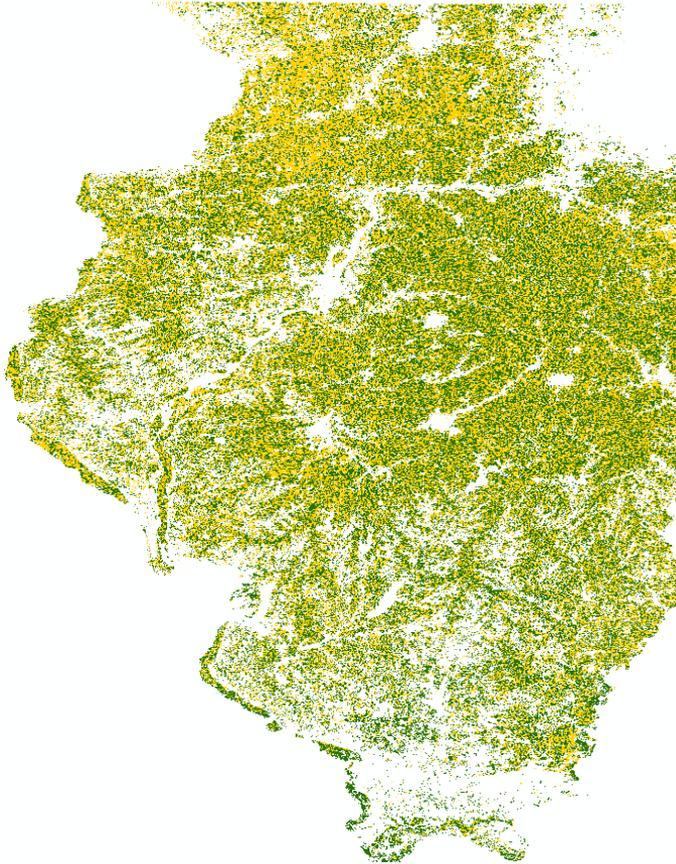
Attachment

cc: Rachael Bender
Evan Swarztrauber
Randy Clarke
Umair Javed
Erin McGrath

Challenge of Extending Mobile Broadband Over Cropland: A Four State Geospatial Analysis

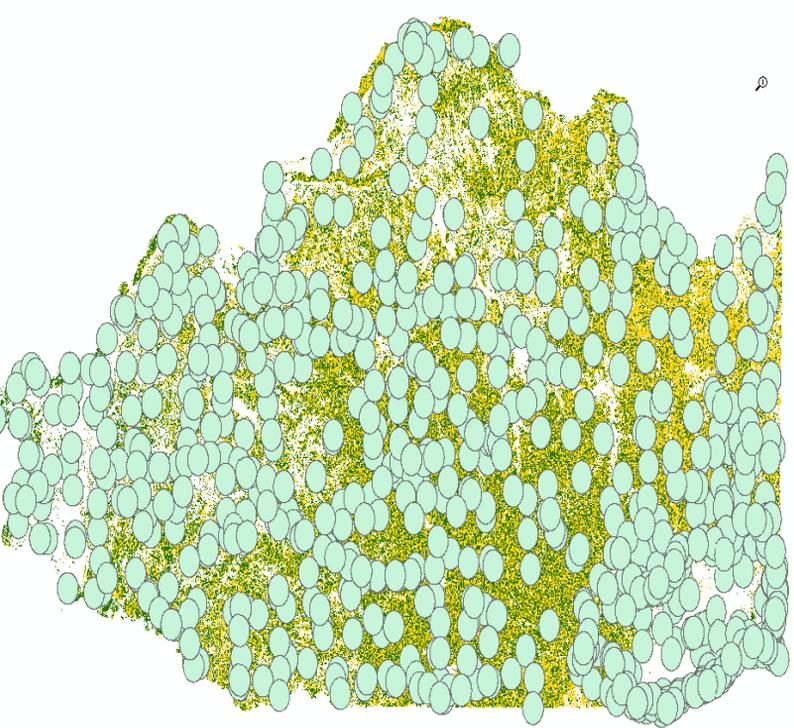


State Level Map Example: Corn and Soybean in Illinois



■ Corn
■ Soybeans

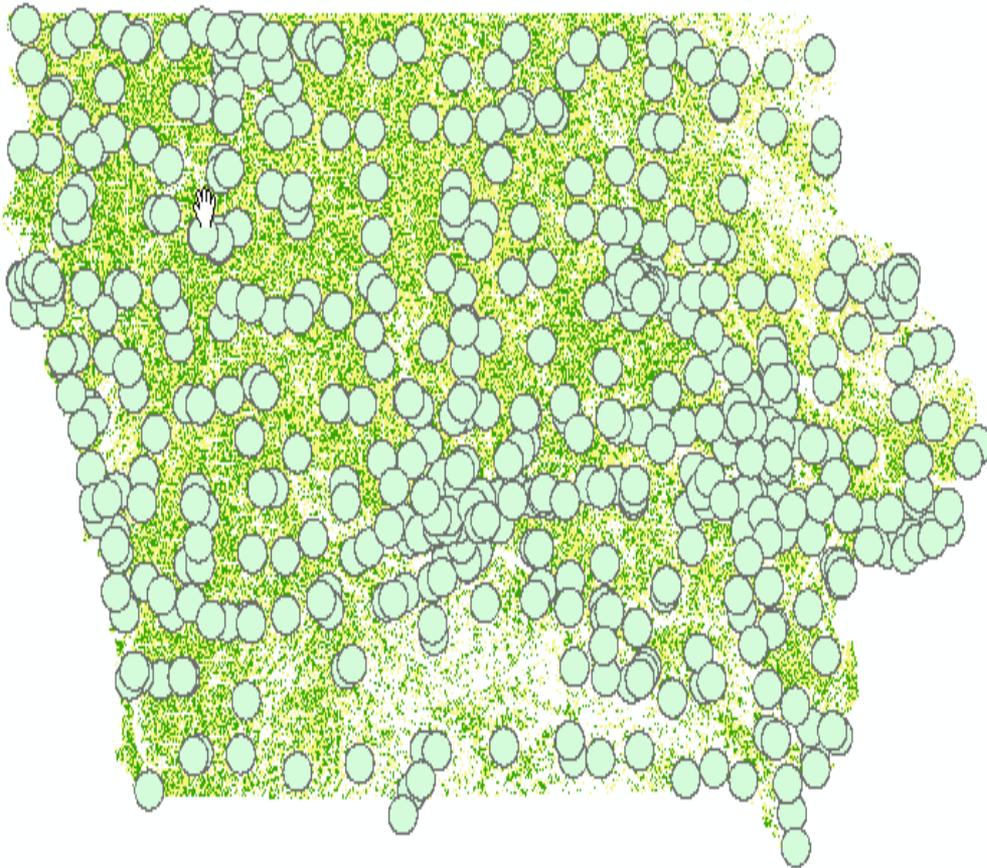
Cell Towers in Illinois



Process to Generate Results

- ESRI ArcMap for geoprocessing
- Clipping, X-Y coordinate plotting
- 5 mile buffer around Cell tower
- Visible open spaces expose gaps
- Uncovered crop area ~9M acres
- Additional Towers needed: ~185

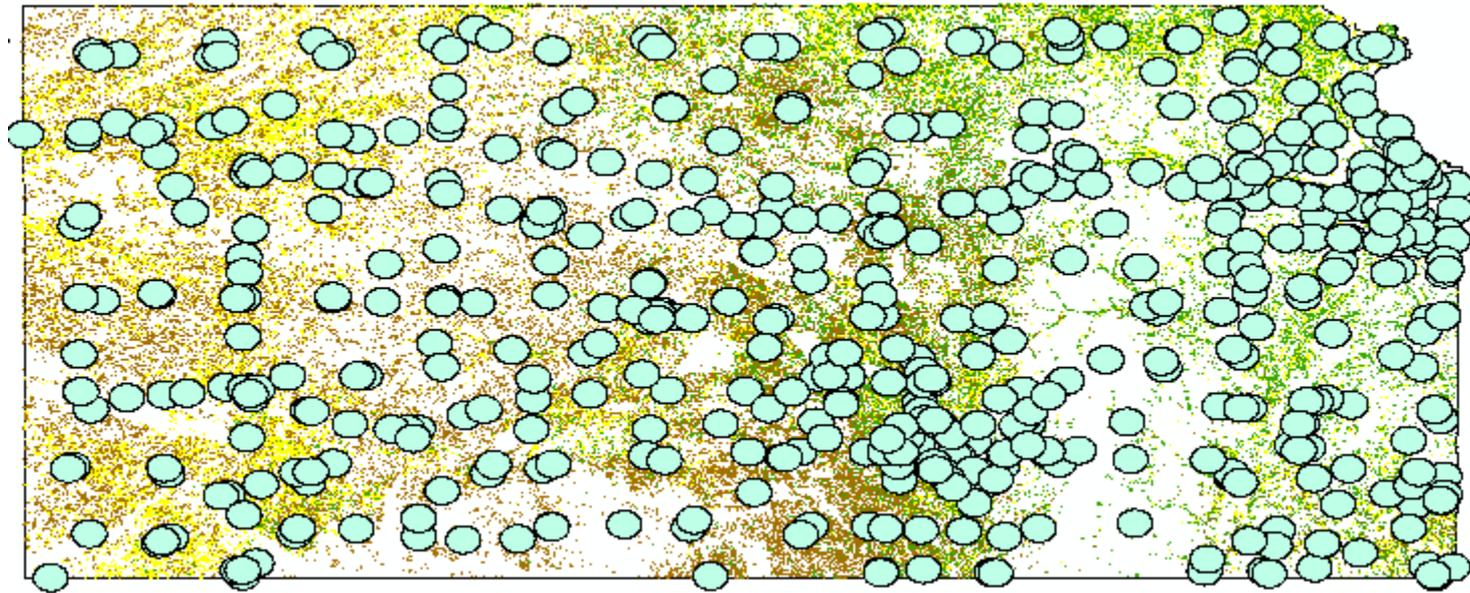
Cell Towers in Iowa



Process to Generate Results

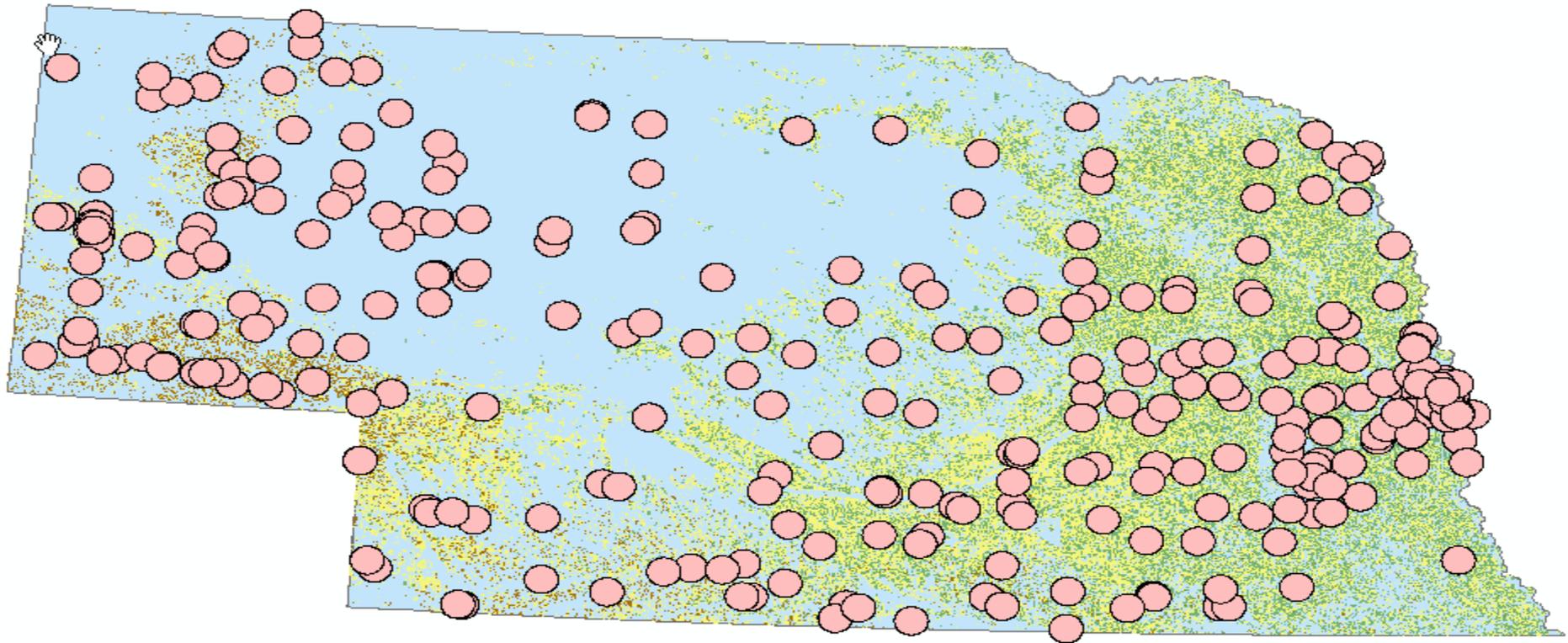
- ESRI ArcMap for geoprocessing
- Clipping, X-Y coordinate plotting
- 5 mile buffer around Cell tower
- Visible open spaces expose gaps
- Uncovered crop area ~12.9M acres
- Additional Towers needed: ~257

Cell Towers in Kansas



- Uncovered crop area $\sim 8.56\text{M}$ acres
- Additional Towers needed: ~ 170

Cell Towers in Nebraska



- Uncovered crop area ~12.03M acres
- Additional Towers needed: ~239

Analytic Results

(Illinois, Iowa, Nebraska, Kansas)

| State | Total acreage of Corn and Soybean in Millions | Uncovered Acres in Millions | Towers Needed | Existing Towers | Percentage Increase |
|-------|--|--------------------------------|---------------|-----------------|------------------------|
| IL | 21.19 | 9.31 | 185 | 2047 | 8.3% |
| IA | 23 | 12.92 | 257 | 833 | 23.6% |
| | Total acreage of Corn, Soybean and Wheat in Millions | | | | |
| NE | 16.26 | 12.03 | 239 | 439 | 35.3% |
| KA | 17.06 | 8.56 | 170 | 1306 | 11.5% |

2017 Cropland Acreage as per USDA

The column "Towers Needed" was calculated by simple math

- We divided the "Uncovered Acres" (Colum 3) by the area of a 5 mile cell
- It is a guesstimate, but it should give lower bound as to the overall magnitude of the problem and the solution
- It does show the answer is in the lower hundreds, and not in the thousands

The last two columns show number of "Existing Towers" and "Percentage Increase"

- The large number in existing towers is due to urban areas where major factors like population density play a major role
- This skews the coverage percentage calculations downward and does not accurately reflect the true "Percentage Increase" of rural coverage



JOHN DEERE